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EXAMINER
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SYKES, ALTREV C

ART UNIT	PAPER NUMBER
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1794

NOTIFICATION DATE	DELIVERY MODE
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08/06/2009

ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

ADIPFDD@bipc.com

<b>Office Action Summary</b>	<b>Application No.</b> 10/519,537	<b>Applicant(s)</b> KOOPS ET AL.	
	<b>Examiner</b> ALTREV C. SYKES	<b>Art Unit</b> 1794	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 26 May 2009.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-5,7 and 9-35 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-5,7 and 9-35 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>20080924, 20090526</u>  | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on May 26, 2009 has been entered.

### ***Response to Amendment***

2. Examiner acknowledges the amendment to the claims filed May 26, 2009. Claims 6 and 8 have been cancelled. Claims 1-5, 7 and 9-35 are pending in the application.

### ***Information Disclosure Statement***

3. The information disclosure statement (IDS) submitted on September 24, 2009 is in compliance with the provisions of 37 CFR 1.98. Accordingly, the DD 233385 reference of the information disclosure statement is being considered by the examiner.

### ***Response to Arguments***

4. Applicant's arguments with respect to claims 1-3, 6, 7, 9-22, 25-32 and 34 rejected under 35 U.S.C. 102(b) as anticipated by Miller et al. (US 6,500,233) have been considered but are moot in view of the new ground(s) of rejection necessitated by the amendment to

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claim 1. As the primary reference is no longer being applied, the arguments against the remaining rejections of claims 4, 5, 23,24,33, and 35 under 35 U.S.C. 103(a) have been considered but are also moot in view of the new ground(s) of rejection. Examiner notes that the only arguments against the secondary and tertiary references of Wang et al. (US 5,834,107) and Boggs et al. (WO 00/02638) are that they do not cure the deficiencies of the Miller reference. As such, examiner maintains the position that Wang and Boggs are pertinent to the instant invention.

***Claim Rejections - 35 USC § 102***

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 1-3, 6, 7, 9-22, 25-32, and 34 are rejected under 35 U.S.C. 102(b) as being anticipated by Howard et al. (US 5, 093,197) as evidenced by the EPA Technical Bulletin on Zeolite.

Regarding claims 1 and 29 Howard et al. discloses fibers and filaments are formed by the process of preparing a mixture of an ultra-high-molecular-weight polyolefin, filler and plasticizer, conveying the extrudate to a fiber or filament forming type die, expressing the extrudate through the die openings to form fibers or filaments, and extracting at least a

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portion of the extractable plasticizer to provide the desired porosity. (See Abstract)

Examiner therefore equates the polyolefin as disclosed by Howard et al. to the polymeric support matrix as claimed by applicant. Howard et al. discloses in the filaments and fibers, the amount of filler is preferably greater than the amount of polymer, i.e., the filler constitutes about 90% by volume (about 95% by weight) of the filament or fiber. (See Col 2, lines 56-64) The filler may comprise particles. (See Col 3, lines 26-29) Examiner therefore equates the filler as disclosed by Howard et al. to the particulate material as claimed by applicant. Howard et al. discloses preferred plasticizers are those extractable organic substances that have a solubility parameter close to that of the polyolefin. A mixture of plasticizers may also be used. (See Col 3, lines 58-67 and Col 4, lines 1-3) Howard et al. discloses the plasticizer may be a liquid. (See Col 5, lines 3-4) Therefore, examiner equates the plasticizer as disclosed by Howard et al. to the solvent as claimed by applicant. Howard et al. discloses the extrusion mixture is metered to any conventional extrusion device. (See Col 5, lines 25-28) The output of the extrusion device is fed to a die suitable for forming filaments or fibers, such as a spinneret type die. (See Col 5, lines 39-41) Such dies are well known in the art, and may include manifolds on one or both sides of the die orifices for directing a hot gas stream against the extrudate at an angle designed to attenuate the filaments or fibers being extruded. (See Col 5, lines 45-49) Therefore examiner equates the hot gas stream as disclosed by Howard et al. to the process of applicant resulting in a first phase separation of the exterior of the nascent fiber. Howard et al. discloses the extraction of the plasticizer may be carried out on a batch basis or on a continuous basis by passing the filaments or fibers, through a liquid

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and/or vapor bath of the extraction media, generally in a countercurrent extraction manner. (See Col 6, lines 45-50) Therefore, examiner equates the bath process as disclosed by Howard et al. to the second phase separation and arrest of the structure as claimed by applicant. Finally, Howard et al. discloses the process forms solid fibers or filaments. (See Col 8, lines 65-67)

Regarding claim 2, Howard et al. discloses in the filaments and fibers, the amount of filler is preferably greater than the amount of polymer. (See Col 2, lines 56-64) Howard et al. discloses blend is introduced into the extruder which comprises from about 5 to about 65 percent by volume of the ultrahigh molecular weight polyolefin component, about 5 to about 60 volume percent of the filler component and about 20 to about 80 percent (preferably about 50 to about 80 percent) by volume of the plasticizer component. (See Col 4, lines 61-68) Examiner therefore notes that the mixture as claimed by applicant is anticipated by the prior art.

Regarding claims 7 and 27, Howard et al. discloses the filler should comprise between about 40 and about 60 percent by volume for uses where resistance to rapid wettability of the web formed from the fibers and filaments is desired and preferably between about 60 and about 90 percent by volume where such rapid wettability is desired. (See Col 4, lines 43-49) Examiner notes that Howard et al. discloses 90% by volume of filler is equivalent to 95% by weight of the filament or fiber. Therefore, Howard et al. anticipates the claimed range of applicant for particulate material.

Regarding claims 10 and 25, Howard et al. discloses the use of a die which may include manifolds on one or both sides of the die orifices for directing a hot gas stream against the extrudate at an angle designed to attenuate the filaments or fibers being extruded. (See Col 5, lines 45-49) Therefore, examiner notes that the hot gas stream would readily comprise a nonsolvent for the polymer (i.e. air).

Regarding claims 14, 26, and 28 Howard et al. discloses the preferred filler materials are those that have surface silanol groups, i.e., siliceous fillers, which can hydrogen bond to water, such as silica, mica, montmorillonite, asbestos, talc, diatomaceous earth, vermiculite, synthetic and natural zeolites, portland cement, silicates and polysilicates, alumina silica gels, and glass particles. The preferred siliceous filler is silica, and precipitated silica is the preferred type of silica. (See Col 3, lines 18-25) Howard et al. discloses the filler should, desirably, have a high surface area, which means it has either a small particle size or a high degree of porosity (i.e., high surface area or pore volume), or both. (See Col 3, lines 26-29) Therefore, examiner notes that one of ordinary skill in the art at the time of the invention would have readily expected the particulate material to be altered in its function since Howard et al. discloses that it is preferred that the filler be able to hydrogen bond to water by providing surface silanol groups.

Regarding claim 15, examiner notes that zeolite are adsorptive material as evidenced by its known frequent use in filter materials. (See also Col 3, lines 12-15)

Regarding claim 16, examiner notes that a zeolite is also called an ion exchange resin, particularly when used as a water softener as would be readily known by one of ordinary skill in the art.

Regarding the limitation of claim 18 it should be noted that the recitation of “the particulate material is used for size exclusion” are considered to be intended use statements and are not given patentable weight at this time since the prior art meets the structural and/or chemical limitations set forth and there is nothing on record to evidence that the prior art product could not function in the desired capacity or that there is some additional implied structure associated with the term. The burden is shifted upon the Applicant to evidence the contrary. Howard et al. discloses the filler is used to provide enhanced microporosity to the filaments and fibers. (See Col 2, lines 46-48) Further, Howard et al. discloses the fibers and filaments, as well as the fabrics and webs made therefrom, also make excellent filter media and can also be used as the substrate for timed release of pharmaceuticals, agricultural and other chemicals. (See Col 9, lines 3-7)

Regarding claim 22, it is noted by examiner that the United States Environmental Protection Agency published that zeolite can be a solid acid catalyst. It can function as a strong acid when the hydration has substituted a hydrogen for the additional valence electron, or isoelectronic exchange with aluminum occurs. (See pg. 11, EPA Technical



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Bulletin) Therefore, one of ordinary skill in the art of synthesizing zeolite would have readily known to functionalize the particulate material with a catalyst.

Regarding claims 30 and 31, Howard et al. discloses a particularly good use for the woven and nonwoven webs made from the filaments and fibers as battery separators. (See Col 9, lines 8-10) Howard et al. discloses the separators may be substituted for glass fiber type separators currently used in both flooded cell and starved electrolyte batteries. (See Col 9, lines 44-46) Examiner therefore equates the batteries comprising fibers as disclosed by Howard et al. to a module (i.e. housing and body) comprising fiber as claimed by applicant.

Regarding claims 32-35, it should be noted that the recitation of “a method for the adsorption and/or purification of compounds from a mixture, a method for the immobilization of a catalyst in a reaction mixture, a method for the immobilization for a chemical or biological compound, and a method wherein the mixture of compounds is a fermentation broth, a tissue brother, a plant broth, or a cell broth” are anticipated by the prior art. Howard et al. discloses the fibers and filaments, as well as the fabrics and webs made therefrom, make excellent filter media and can also be used as the substrate for timed release of pharmaceuticals, agricultural and other chemicals. (See Col 9, lines 3-7) The prior art meets the structural and/or chemical limitations set forth and there is nothing on record to evidence that the prior art product could not function in the desired capacity or that there is some additional implied structure associated with the terms.

***Claim Rejections - 35 USC § 103***

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:
- (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.
8. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:
1. Determining the scope and contents of the prior art.
  2. Ascertaining the differences between the prior art and the claims at issue.
  3. Resolving the level of ordinary skill in the pertinent art.
  4. Considering objective evidence present in the application indicating obviousness or nonobviousness.
9. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Howard et al. (US 5, 093,197) in view of the EPA Technical Bulletin on Zeolite.

Regarding claim 17, Howard et al. discloses the fibers are hydrophobic at lower filler loadings. (See Col 7, lines 66-68) Howard et al. discloses that in addition to natural zeolite, synthetic zeolite is also a preferred filler material. (See Col 3, lines 18-25) Howard et al. is not explicit to the adsorptive material being hydrophobic in nature.

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The United States Environmental Protection Agency published that zeolite is synthesized to allow scientists to predict the properties of the zeolite and to make hydrophobic zeolite. (See pg. 9, EPA Technical Bulletin)

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to synthesize zeolite in order to provide for a filler material having specific properties, such as an adsorptive particulate material which is hydrophobic in nature, motivated by the desire to tailor the filler material in the fibers for specific use in filter media applications. (See Col 9, lines 3-7)

10. Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Howard et al. (US 5, 093,197) in view of Arnold et al. (US 5,786,428).

Regarding the limitation of claim 19 Howard et al. discloses the filler material may be carbonaceous material, metal oxides and hydroxides, metal carbonates, minerals, synthetic and natural zeolites, portland cement, precipitated metal silicates, alumina silica gels, glass particles, and salts. (See Col 3, lines 4-17) Howard et al. discloses the preferred filler materials are those that have surface silanol groups and include siliceous filler such as silica and participated silica. (See Col 3, lines 18-25) Howard et al. discloses the fibers and filaments, as well as the fabrics and webs made therefrom, also make excellent filter media and can also be used as the substrate for timed release of pharmaceuticals, agricultural and other chemicals. (See Col 9, lines 3-7)

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However, Howard et al. does not specifically disclose the particulate material is used for separation of optically active compounds.

Arnold et al. discloses separation systems are disclosed which use the adsorbent as the basis for conducting enantioresolution of optically active amino acids and peptides and methods for using the adsorbent. (See Abstract) Arnold et al. discloses molecularly imprinted materials are presented which are well-suited for purification and enantiomeric resolution of amino acids and peptides. (See Col 2, lines 60-63) Arnold et al. discloses the imprinted polymer matrix is also presented as a surface coating on support particles for use in separation procedures. Monodisperse, spherical silica particles are well-suited for use as the support. The silica particles are derivatized using appropriate silanizing agents. (See Col 3, lines 33-40) Arnold et al. discloses an exemplary system for conducting enantiomeric resolution of optically active amino acids and peptides includes a separation vessel 10 which is a ligand exchange column where the separation zone 12 is packed with silica particles which have been coated with adsorbent that selectively binds the d optical isomer of an amino acid such as phenylalanine. (See Col 8, lines 8-10 and 14-19)

Therefore, while Howard et al. is not explicit to the use of the siliceous fillers of silica particulate material in the fibers to separate optically active compounds, it would have been obvious to one of ordinary skill in the art at the time of the invention motivated by expected success to utilize the silica particles which have been coated with adsorbent as

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taught by Arnold et al. in said manner since Arnold et al. teaches doing so would provide favorable results.

11. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Howard et al. (US 5, 093,197) in view of Pretorius et al. (US 3,493,497).

Regarding the limitation of claim 21 Howard et al. discloses the filler material may be carbonaceous material, metal oxides and hydroxides, metal carbonates, minerals, synthetic and natural zeolites, portland cement, precipitated metal silicates, alumina silica gels, glass particles, and salts. (See Col 3, lines 4-17) Howard et al. discloses the preferred filler materials are those that have surface silanol groups and include siliceous filler such as silica and participated silica. (See Col 3, lines 18-25) Howard et al. discloses the fibers and filaments, as well as the fabrics and webs made therefrom, also make excellent filter media and can also be used as the substrate for timed release of pharmaceuticals, agricultural and other chemicals. (See Col 9, lines 3-7) However, Howard et al. does not specifically disclose the particulate material is used for reversed phase chromatography.

Pretorius et al. discloses a chromatographic separating process which can be adapted to produce very rapid separations in a given system. (See Col 1, lines 67-70) Pretorius et al. discloses the process may be applied to the separation or concentration of substantially all substances inherently capable of chromatographic separation or concentration and is

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adaptable to virtually any known type of chromatography e.g. liquid-liquid partition chromatography (including reversed phase), and liquid-solid chromatography (where the solid phase may be an adsorbent). (See Col 3, lines 52-60) Pretorius et al. discloses to improve separations and separating capacity whole pipelines adapted for the process may also be packed with a stationary phase or a support carrying a stationary phase. (See Col 7, lines 5-10) Pretorius et al. discloses the packing material should preferably be composed of rounded, e.g. approximately spherical, particles. (See Col 8, lines 5-10) The particles may for example be composed of silica gel, alumina, magnesium silicate, various metals, glass, activated carbon, and various organic or inorganic solid adsorbents. (See Col 8, lines 15-21)

Therefore, while Howard et al. is not explicit to the use of the silica gel particulate material in the fibers for reversed phase chromatography, one of ordinary skill in the art at the time of the invention would have readily appreciated the known use of silica gel as packing material in columns for reversed phase chromatography as taught by Pretorius et al..

12. Claims 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Howard et al. (US 5, 093,197) as set forth above in view of Koenhen. (US 6,454,943).

Regarding claim 24, Howard et al. also discloses the extrusion mixture is metered to any conventional extrusion device known to be suitable in the art of filament and fiber

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formation. There are a number of manufacturers supplying such devices which come in various sizes dependent upon the throughput of material desired. (See Col 5, lines 25-31) While Howard et al. discloses all of the claim limitations as set forth above, the reference is not explicit to a thread, wire, yarn or the like of any material is co-extruded with the fibre.

Koenhen discloses a self-supporting capillary membrane, which is longitudinally reinforced with one or more continuous reinforcing fibres incorporated in the wall material of the capillary membrane, which fibres extend in the longitudinal direction of the capillary membrane, said membrane being obtained by extruding the hollow fibre in a known manner using an extruder and guiding the reinforcing fibres through the spinneret of the extruder so that the reinforcing fibres are coextruded with the membrane in the longitudinal direction and are incorporated in the wall of the capillary membrane. (See Col 3, lines 25-36 and 45-63) Koenhen also discloses use of the membrane in the filtration of suspended solids and particles, and separation of solutes and liquids, of liquids and of liquids and gases. (See Col 3, lines 64-67)

As Howard et al. and Koenhen are both directed to hollow fibers for use in filtration media, the art is analogous. Therefore, it would have been obvious to one of ordinary skill in the art motivated by expected success to co-extrude reinforcing fibers as taught by Koenhen with the hollow fiber of Howard et al. since doing so would provide the completely expected result of mechanical enforcement. Additionally, one of ordinary

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skill in the art would have been easily motivated to use the coextrusion process as taught by Koenhen in place of the extrusion process as taught by Howard et al. since Howard et al. clearly discloses that the throughput material desired would control the parameters of the extrusion process. (See Col 5, lines 25-31)

Regarding the limitation of claim 24 it should be noted that the recitation of “for mechanical enforcement” is considered to be intended use statements and are not given patentable weight at this time since the prior art meets the structural and/or chemical limitations set forth and there is nothing on record to evidence that the prior art product could not function in the desired capacity or that there is some additional implied structure associated with the term. The burden is shifted upon the Applicant to evidence the contrary.

13. Claim 1-5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Van Rijn et al. (WO 02/43937) in view of Howard et al. (US 5, 093,197)

Regarding claims 1, 12, and 29 Van Rijn et al. discloses a method of producing articles having nano and micro-structured surfaces made from a broad variety of materials which can be applied in a economical and reproducible manner allowing for an industrial scale. (See pg. 1, lines 24-27) Van Rijn et al. discloses the use of phase separation techniques provides porous structures that have improved elastic properties. (See pg. 2-9) Van Rijn et al. discloses polymeric hollow fibre membranes are most of the time produced by a



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spinning technique in combination with a phase separation process. (See pg. 27, lines 18-19) Van Rijn et al. discloses the initial starting dope solution contains at least one membrane matrix forming polymer and a solvent for that polymer. Often other components like non-solvents, a second or even a third polymer, salts, etc. are added to manipulate the membrane structure. This dope solution is shaped into a hollow fibre or capillary by the use of a spinneret or nozzle and the shape is formed and fixated by a phase separation process. After leaving the spinneret the nascent fibre can either pass through a so-called air gap before the fibre is immersed in a non-solvent or solvent/non-solvent bath or can enter or being contacted by a non-solvent or non-solvent/solvent bath immediately. The first process is called dry-wet spinning and is normally performed using a tube-in-orifice spinneret (FIG. 22A), the latter process is called wet-wet spinning and is normally performed by a triple layer spinneret (FIG. 22B). (See pg. 27, lines 19-29) Van Rijn et al. discloses phase separation of a polymer solution can also be performed when the solution contains inorganic filler materials such as small silica to influence the porosity or to prepare a polymer/inorganic precursor. (See pg. 4, lines 5-10) Van Rijn discloses hollow fibre membranes are applied in all kind of separation processes, like gas separation, reverse osmosis, nanofiltration, ultrafiltration, microfiltration, membrane extraction, membrane contactor applications, supported liquid membrane applications, but not limited to these applications. (See pg. 27 lines 1-4) While Van Rijn discloses all of the claim limitations as set forth above but fails to teach the fiber containing about 60-95 wt% of particulate material.

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Howard et al. discloses in the hollow filaments and fibers, wherein the amount of filler is preferably greater than the amount of polymer. (See Col 2, lines 56-64) Howard et al. discloses the filler should comprise between about 40 and about 60 percent by volume for uses where resistance to rapid wettability of the web formed from the fibers and filaments is desired and preferably between about 60 and about 90 percent by volume where such rapid wettability is desired. (See Col 4, lines 43-49) Examiner notes that Howard et al. discloses 90% by volume of filler is equivalent to 95% by weight of the filament or fiber. Howard et al. discloses the fibers and filaments, as well as the fabrics and webs made therefrom, make excellent filter media and can also be used as the substrate for timed release of pharmaceuticals, agricultural and other chemicals. (See Col 9, lines 3-7)

As Van Rijn et al. and Howard et al. are both directed to hollow fibers for filtration, the art is analogous. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention motivated by expected success to utilize the filler amount as taught by Howard et al. for the hollow fiber membranes as disclosed by Van Rijn since Howard et al. has already shown success with high loading of hollow fibers for filter media. One of ordinary skill in the art would have been further motivated to utilize the filler amounts as taught by Howard et al. with the desire to tailor the hollow fiber membranes of Van Rijn for water resistance or for rapid wettability.

Regarding claims 3-5, 9, 11 Van Rijn discloses when a system is chosen with a solvent and a non-solvent having a strong interaction, immersing the polymer solution in such a

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non-solvent results in instantaneous demixing. Examples of such systems are N-methyl pyrrolidone(NMP), dimethylsulfoxide (DMSO), dimethylfluoride (DMF) or dimethylacetamide (DMAc) as solvent and water as non-solvent. (See pg. 3, lines 30-35) Van Rijn discloses when the system is chosen with a poor interaction between solvent and non-solvent, immersing the polymer solution in such a non-solvent results in delayed demixing. This process is characterized by extremely thick and dense skin layers. (See pg. 3, lines 35-37) Examples of such systems are: acetone and THF as solvent and water as non-solvent or NMP, DMAc, DMF, DMSO as solvent and higher alcohols (like butanol, pentanol, octanol) or glycols as non-solvent. (see pg. 3, lines 41-43) Van Rijn discloses another system that can be distinguished is the immersion of a polymer solution in a mixture of solvent and non-solvent. This process also results in delayed demixing, but gives normally very porous skin layers. (See pg. 3, lines 43-45) Van Rijn discloses the porous morphology of the product can be influenced by the addition of low molecular weight additives such as ethylene glycol, aliphatic alcohols and surfactants. (See pg.3 lines 54-55) While the reference does not explicitly teach polyethylene glycol, it would have been obvious to one of ordinary skill in the art at the time of the invention in view of the Van Rijn et al. disclosure motivated by expected success to utilize a polyethylene glycol as the additive since the reference clearly teaches the favorable use of ethylene glycol to control the porous morphology.

Further regarding claim 4, Van Rijn discloses all of the claim limitations as set forth above but fails to teach the solvent is replaced by 0.01-50% by weight of one or more

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additives and/or non-solvents. It would have been obvious to one of ordinary skill in the art at the time the invention was made to optimize the weight percent of additive since it has been held that, where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation. *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955). The burden is upon the Applicant to demonstrate that the claimed the weight percent of additive is critical and has unexpected results. In the present invention, one would have been motivated to optimize the weight percent of additive motivated by the desire to the tailor the porous morphology of the product. (See pg.3 lines 54-55)

Regarding claim 13, Van Rijn discloses an example of the production of an ultrafiltration membrane by a dry-wet spinning process is as follows: polyethersulfone (Ultrason E 620p, BASF) is dissolved in N-Methyl pyrrolidone, polyethylene glycol (PEG 200) and water. (See pg. 27, lines 30-35) Examiner notes polyethersulfone as the polymeric material.

14. Claim 1-2, 15, 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Coplan et al. (US 4,302,509)

Regarding claims 1, 15 and 23 Coplan et al. discloses methods of fabricating filaments, which are adapted to porosify the wall of the sheath and to prevent the occlusion of the sorptive filler by the polymer. According to this method, a particulate sorptive material is

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dispersed in a liquid carrier to form a slurry, the slurry forming a continuously extrudable core. A blend is separately prepared by melt-blending the polymer such as polypropylene with a pore-forming material such as paraffin wax. The blend and slurry are then pumped and metered in separate streams into a needle-in-orifice type multifilament hollow fiber spinneret to form the composite filaments. (See Col 2, lines 22-34) Coplan et al.

discloses the slurry is made by dispersing in a colloid mill active carbon particles, pulverized to less than 325 mesh, in triethylene glycol. (See Col 2, lines 65-67) Coplan et al. discloses a melt blend is separately prepared suitably for extrusion and comprises polypropylene and a paraffin wax. The wax is chosen for its ability to separate out of the polymer upon cooling, and thereby to leave voids or pores that are mutually interconnected after subsequent extraction of the wax. (See Col 3, lines 17-24) Coplan et al. discloses the blend and the slurry are then pumped and metered in separate streams and extruded. (See Col 3, lines 25-27) Coplan et al. discloses the extruded hollow filament 24 with the blend forming the wall or sheath and the slurry forming the core is spun down a 15-foot cooling stack. (See Col 3, lines 33-34) Examiner notes that the filament is spun down a 15-foot cooling stack which would inherently provide for a controlled flow of gas (i.e. air) as an exterior medium resulting in a first phase separation as claimed by applicant. Coplan et al. discloses after spin drawing, the filaments may be further drawn in a liquid bath. (See Col 3, lines 37-38) Examiner equates the liquid bath as taught by Coplan et al. to the coagulation bath as claimed by applicant, thereby resulting in further phase separation and arrest of the fiber structure. Finally, Coplan et al. discloses the sorptive material comprises a large percentage of the weight of the fibers.

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For example activated carbon may comprise between 20 and 70 percent by weight of the fiber. (See Col 4, lines 63-66) Therefore, it would have been obvious to one of ordinary skill in the art motivated by expected success to utilize the disclosure of Coplan et al. for porous hollow filaments to arrive at applicant's claimed invention.

Regarding claim 2, Coplan et al. discloses that a molten paraffin wax may be used as the carrier material instead of triethylene glycol with carbon loadings up to 30% or higher. (See Col 5, lines 12-14) As such, examiner notes that 30% carbon loading would leave 70% for the molten wax as the slurry. In this case, the melt blend would consist substantially of 100% polypropylene. When blended together to be extruded, examiner finds that the total mixture would comprise 50% polypropylene, 15% activated carbon, and 35% molten wax.

Extruded Mixture	Total Composition	Final Mixture Components
100% Blend = 100% Polypropylene	100% Blend + 100% Slurry = 200% extrudate	Each component is divided by the total extrudate
100% Slurry = 30% or higher of Carbon particles and 70% or less of molten wax		$100 / 200 = 50\%$ polypropylene $30 / 200 = 15\%$ or higher carbon $70 / 200 = 35\%$ or less molten wax

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Examiner notes that this mixture meets the limitations of applicant.

15. Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Coplan et al. (US 4,302,509) in view of Hensley et al. (US 3,344,177)

Regarding claim 19, Coplan et al. discloses the sorptive material comprises a large percentage of the weight of the fibers. For example, activated carbon may comprise between 20 and 70 percent by weight of the fiber. (See Col 4, lines 63-66) While Coplan et al. discloses the use of activated carbon, the reference does not specifically disclose the particulate material in the fibers is used for separation of isomeric compounds.

Hensley et al. discloses a purification method to obtain a substantially pure water-insoluble aromatic dicarboxylic acid product from lower purity crude products. (See Col 1, lines 10-18) Hensley et al. discloses recrystallization, washing, separation of one isomeric form from another or recovery from the oxidation reaction medium alone or in combination will produce a crude aromatic dicarboxylic acid in commercial processes. (See Col 2, lines 13-16) Hensley et al. discloses one process readily adaptable to commercial industrial operation produces an aromatic polycarboxylic acid of at least 99.9% purity or above by passing a non-alkaline aqueous solution of an alkaline salt of the aromatic dicarboxylic acid through a bed of activated carbon or charcoal. (See Col 2, lines 36-40)

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Therefore, while Coplan et al. is not explicit to the use of the particulate material in the fibers to separate isomeric compounds, it would have been obvious to one of ordinary skill in the art at the time of the invention motivated by expected success to utilize activated carbon to separate isomeric compounds since Hensley et al. exemplifies this concept.

16. Claims 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Howard et al. (US 5, 093,197) as applied to claim 1 above and in view of Boggs et al. (WO 00/02638)

This rejection is over WO 00/02638 because the reference qualifies as prior art under 102(b). However, for convenience, the column and line numbers of the English language equivalent and national stage entry, US 6,899,834, will be cited below.

Regarding claims 23, Howard et al. discloses all of the claim limitations as set forth above, but the reference does not disclose the particulate material is active carbon.

Boggs et al. discloses membranes for removing organic compounds that have been added to a biological fluid which include a polymeric matrix and a particulate material immobilized within the matrix. (See Abstract) Boggs et al. discloses the composite membrane includes selectively permeable skin on the outer surface of the membrane. (See Col 3, lines 44-46) Boggs et al. discloses the membranes may also be in the form of other configurations such as fibers. (See Col 6, lines 1-2) Boggs et al. discloses the skin



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may include randomly spaced surface pores. (See Col 6, lines 33-34) Boggs et al. discloses it is desirable that the amount of solids in the blend (i.e., excluding the solvent) include anywhere between 40%-90%, by weight, of the particulate material and between about 10%-60%, by weight, of the polymeric material. (See Col 7, lines 49-53) The polymeric materials and particulate materials are combined to form a slurry-like blend. (See Col 7, lines 41-42) A variety of suitable solvents including NMP and DMAc may be used for the polymeric materials. (See Col 8, lines 23-31) Boggs et al. further discloses where the membrane is used to absorb selected organic compounds from a biological fluid, the particulate material may be a sorbent. Of course, selection of the sorbent may also depend, in part, on the affinity of the compound to be removed for the particular sorbent. Activated charcoal is a known and preferred sorbent. (See Col 7, lines 5-7 and 15-16)

As Howard et al. and Boggs et al. are both directed to methods for making polymeric membranes comprising particulate material, the art is analogous. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to utilize the activated charcoal as the particulate material in the fibers as disclosed by Howard et al. motivated by expected success to provide membranes for commercial purifications such as for biological fluid. (See Col 1, lines 5-15) The substitution of one adsorbent material (i.e. zeolite) for another (i.e. activated charcoal) would have been completely within the ordinary skill of one in the art at the time of the invention.

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17. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

### ***Conclusion***

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to ALTREV C. SYKES whose telephone number is (571)270-3162. The examiner can normally be reached on Monday-Thursday, 8AM-5PM EST, alt Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Larry Tarazano can be reached on 571-272-1515. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/D. Lawrence Tarazano/  
Supervisory Patent Examiner, Art Unit 1794

/ACS/  
Examiner  
7/22/09